REMARKS

The Office Action dated May 24, 2007 has been received and carefully noted. The above amendments to the specification and claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 35, 36, 39-41, 47, 50, 52, 54, 57-61, 65, and 68 have been amended to more particularly point out and distinctly claim the subject matter of the invention. New claim 69 has been added. Claims 37, 38, 48, 55, 56, and 66 have been canceled without prejudice or disclaimer. No new matter has been added. Claims 35, 36, 39-47, 49-54, 57-65, and 67-69 are currently pending in the application and are respectfully submitted for consideration.

The Office Action objected to the specification due to a minor informality. Specifically, the Office Action stated that the terms "BTS1 10," "BTS2 12," and "BTS3 14," on page 8 of the specification, should be changed to "BTS1 (10)," "BTS2 (12)," and "BTS3 (14)" for purposes of clarification. Applicants have amended the specification as suggested by the Office Action. Accordingly, Applicants submit that this objection is rendered moot.

Claims 35-68 were objected to as being improper because the term "element/repeater" needs clarification. Claims 35 and 52 have been amended to clarify that the donor network element or repeater may be selected to be the source of the signal. As such, Applicants submit that this objection is rendered moot.

The Office Action rejected claims 35-68 under 35 U.S.C. §102(e) as being anticipated by Amerga (U.S. Patent No. 7,039,418). This rejection is respectfully traversed for at least the following reasons.

Claim 35, upon which claims 36, 39-47, 49-51 are dependent, recites a method of determining the path of a signal between a donor network element and a remote station, the donor network element being associated with at least one repeater. The method includes receiving at the remote station a plurality of signals associated with a plurality of network elements, calculating an estimate of the distance between the remote station and each network element, based on the received plurality of signals, including an estimate of the distance between the remote station and each repeater associated with the donor network element. The calculating of the estimate of the distance includes estimating the location of the remote station and thereby estimating an actual distance between each donor network element and the remote station and estimating an actual distance between each repeater and the remote station; and wherein the calculating of the estimate of the distance further includes measuring physical quantities at the remote station, and thereby estimating a model distance between each network element and the remote station and estimating a model distance between each repeater and the remote station. The method further includes calculating a difference value for each donor network element and at least one repeater by summing the difference between each actual distance estimate and each model distance estimate obtained for each respective donor network element and at least one repeater, determining that the signal is transmitted from the donor network

element or at least one repeater having the lowest calculated difference value, and selecting that donor network element or repeater to be the source of the signal.

Claim 52, upon which claims 53, 54, 57-65, and 67-68 are dependent, recites a network device configured to determine the path of a signal between a donor network element and a remote station, the donor network element being associated with at least one repeater. The network device includes a distance estimate calculating unit configured to calculate an estimate of the distance between the remote station and each network element, including an estimate of the distance between the remote station and each repeater associated with the donor network element, based on a plurality of signals received at a mobile station. The distance estimate calculating unit includes an estimating unit configured to estimate the location of the remote station and thereby estimate an actual distance between each donor network element and the remote station, and estimate an actual distance between each repeater and the remote station. The distance estimate calculating unit further includes a measuring unit configured to measure physical quantities at the remote station, and thereby estimate a model distance between each network element and the remote station and estimate a model distance between each repeater and the remote station. The network device further includes a difference value calculating unit configured to calculate a difference value for each donor network element and at least one repeater, including a summer configured to sum the difference between each actual distance estimate and each model distance estimate obtained for each respective donor network element and at least one repeater, a determining unit configured

to determine that the signal is transmitted from the donor network element or at least one repeater having the lowest calculated difference value, and a selecting unit configured to select that donor network element or repeater to be the source of the signal.

Claim 69 recites a network device including means for calculating an estimate of a distance between a remote station and each of a plurality of network elements, including an estimate of the distance between the remote station and each of a plurality of repeaters associated with a respective one of the plurality of network elements, based on a plurality of signals received at a mobile station. The means for calculating the estimate of the distance includes means for estimating the location of the remote station and thereby estimating an actual distance between each donor network element and the remote station and estimating an actual distance between each repeater and the remote station. The means for calculating the estimate of the distance further includes means for measuring physical quantities at the remote station and thereby estimating a model distance between each network element and the remote station and estimating a model distance between each repeater and the remote station. The network device also includes means for calculating a difference value for each donor network element and at least one repeater, including a summer for summing the difference between each actual distance estimate and each model distance estimate obtained for each respective donor network element and at least one repeater, means for determining that the signal is transmitted from the donor network element or at least one repeater having the lowest difference value, and means for selecting that network element or repeater to be the source of the signal.

Embodiments of the present invention therefore provide a novel mechanism for detecting a used signal path in the case of the presence of repeaters in a wireless network. It may be detected if the signal received by the mobile station is originating directly from a donor BTS or if the signal has been retransmitted by a repeater associated with the donor BTS.

As will be discussed below, Amerga fails to disclose or suggest all of the elements of the claims, and therefore fails to provide the features discussed above.

Amerga discloses a method for detecting whether a remote terminal is under the coverage of a repeater within a wireless communication network. The detection is based on a list of base stations expected to be received while under the repeater's coverage, the characterized environment of the repeater, and/or the propagation delays for a transmission received at the remote terminal. Additional ambiguity resulting from being under a repeater's coverage may also be accounted and compensated for by discarding time measurements from repeated base stations, adjusting the processing for position estimation to account for the additional ambiguity due to the repeater, computing a series of position estimates based on multiple transmissions received from the same originating base station and selecting the best estimate, or computing a series of position estimates based on multiple transmissions from multiple originating base stations and selecting the best estimate.

Applicants respectfully submit that Amerga fails to disclose or suggest all of the elements of the present claims. For example, Amerga does not disclose or suggest

"calculating a difference value for each donor network element and at least one repeater by summing the difference between each actual distance estimate and each model distance estimate obtained for each respective donor network element and at least one repeater," and "determining that the signal is transmitted from the donor network element or at least one repeater having the lowest calculated difference value," as recited in claim 35 and similarly recited in claims 52 and 69.

Amerga only discloses that the remote terminal reports one time measurement for each originating base station to a Positioning Determining Entity (PDE). This time measurement may be from a base station or a repeater of a repeated base station. The PDE creates a number of hypotheses of the remote terminal location based on a particular guess as to the particular transmission source for each time measurement used to estimate the remote terminal's location. Each hypothesis results in one position fix and an associated error metric. The PDE then selects the position fix having the best metric to determine whether the remote terminal is under the coverage of a repeater or not. The error metric is determined as described in U.S. Patent No. 6,289,280 (see Amerga, Column 17, line 44 – Column 19, line 57, Figures 14 and 15).

Thus, Amerga does not disclose "calculating a difference value for each donor network element and at least one repeater by summing the difference between each actual distance estimate and each model distance estimate obtained for each respective donor network element and at least one repeater," and "determining that the signal is transmitted from the donor network element or at least one repeater having the lowest

calculated difference value." Amerga, as outlined above, only discloses selecting the hypothesis having the best metric. Amerga points to U.S. Patent No. 6,289,280 to describe how the metric is calculated. U.S. Patent No. 6,289,280 discloses calculating the location of a device in a hybrid system of GPS and terrestrial transceiver stations. An algebraic solution is disclosed rather than an iterative least mean square method. The method determines solutions for a location estimate, and the solutions can be substituted back into the system equations to find the particular solution that yields the smallest residuals (errors in the position fixes).

However, U.S. Patent No. 6,289,280 calculates the residuals (error metrics) by substituting potential solutions back into the system equations and calculating the residuals from this substitution. This method does not split up the calculation into separate calculations for the different network elements and repeaters in the system, instead it uses the system equations encapsulating all of the network elements and repeaters to calculate the residuals. Therefore, Amerga and U.S. Patent No. 6,289,280 do not disclose or suggest "calculating a difference value for each donor network element and at least one repeater by summing the difference between each actual distance estimate and each model distance estimate obtained for each respective donor network element and at least one repeater."

Furthermore, in U.S. Patent No. 6,289,280, a location estimate is chosen by selecting the estimate with the lowest residuals in the system equations. This is not the same as "determining that the signal is transmitted from the donor network element or at

least one repeater having the lowest calculated difference value," as recited in the present claims, since these residuals do not correspond to the claimed "difference values."

In addition, in rejecting claims 47 and 48 the Office Action cited Column 9, lines 23-67, Column 10, lines 33-67, Column 1, lines 1-26, Column 12, lines 7-11, Column 15, lines 65-67, and Column 16, lines 1-32 of Amerga. Similar limitations to those of claims 47 and 48 have now been incorporated into the independent claims. Applicants submit that the sections of Amerga cited by the Office Action do not disclose or suggest the features of claims 47 and 48. If the Office Action maintains the rejections of the claims based on these sections of Amerga, Applicants respectfully request an explanation of how these portions of Amerga anticipated the claimed limitations.

Therefore, for at least the reasons discussed above, Applicants respectfully assert that Amerga fails to disclose or suggest "calculating a difference value for each donor network element and at least one repeater by summing the difference between each actual distance estimate and each model distance estimate obtained for each respective donor network element and at least one repeater," and "determining that the signal is transmitted from the donor network element or at least one repeater having the lowest calculated difference value," as recited in claim 35 and similarly recited in claims 52 and 69. As such, Applicants respectfully request that the rejection of claims 35 and 52 be withdrawn, and that claims 35, 52, and 69 be allowed.

Claims 36, 39-47, 49-51, 53, 54, 57-65, and 67-68 are dependent upon claims 35 and 52, respectively. Accordingly, claims 36, 39-47, 49-51, 53, 54, 57-65, and 67-68

should be allowed for at least their dependence upon claims 35 and 52, and for the specific limitations recited therein.

For at least the reasons outlined above, Applicants respectfully submit that Amerga fails to disclose or suggest all of the elements of the claimed invention. These distinctions are more than sufficient to render the claimed invention unanticipated and unobvious. It is therefore respectfully requested that all of claims 35, 36, 39-47, 49-54, 57-65, and 67-69 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

Majid S. AlBassam
Registration No. 54,749

Customer No. 32294
SQUIRE, SANDERS & DEMPSEY LLP
14TH Floor
8000 Towers Crescent Drive
Tysons Corner, Virginia 22182-2700
Telephone: 703-720-7800
Fax: 703-720-7802

MSA:jf

Enclosures: Petition for Extension of Time